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APS Picks Minority Scholars
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Physics Programs Face the Axe at Seven Texas Universities

By Michael Lucibella

Seven public universities in Texas are being told they have to phase out their physics undergraduate degrees, with three more being put on two-year probation. In an attempt to make the system more efficient, the Texas Higher Education Coordinating Board (THECB), which oversees Texas' 24 public universities, recently reviewed all of its public university's undergraduate programs that produced a small number of graduates, and recommended a number for termination.

"In this time of budget cuts, states, in particular Texas, have been very adamant about cutting their budget," said Mario Diaz, director of the Center for Gravitational Wave Astronomy at the University of Texas at Brownsville.

In February, the THECB notified programs that produced fewer than an average of five undergraduates per year between 2006 and 2010 that they needed to reevaluate their programs by June. The programs that received a warning had the option to shut down altogether, combine their program with another degree or apply for a two-year temporary exemption to try and increase enrollment.

"What we are looking at is low producing programs," said MacGregor Stephenson, assistant commissioner for academic programs and research on the THECB. He added that physics and other STEM programs weren't singled out and many programs weren't graduating the minimum number of students. "What we found was there were 545 programs that were low producing using those criteria."

Of the hundreds of programs across the state found to be low producing, 307 requested temporary exemptions, 93 proposed a plan for consolidating degrees, and 145 offered to phase out their programs altogether. Eighty-seven of the requests for exemptions were denied.

Physics programs at Midwestern State, Prairie View A&M, Tarleton State, Texas Southern, University of Texas-Brownsville and West Texas A&M are all losing their undergraduate physics programs. Current students can finish out their degree, while no new physics students can be accepted. Texas A&M Commerce, the University of Texas-Pan American and Texas Tech are all on two-year probation.

Most of the schools with programs slated for termination are in rural regions, many in economi-

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Apps to Enhance Program Access at Three APS Fall Meetings

Scheduling for the APS fall meetings will be a little more portable this year. APS has signed a contract to develop smart-phone apps to help attendees plan their meeting schedules. The interactive apps will let users pick out sessions to attend, while reducing the need for bulky meeting programs.

"It's another way to access the program on site," said APS Meetings Abstracts Coordinator Vinaya Sathyasheelappa. "We have the technology–we might as well use it."

The upcoming apps will let users access meeting abstracts, maps and exhibitor lists from their smart phones. In addition, the apps will feature a personal scheduler and will be able to be updated in real time should there be a change to the original program. The new apps are planned to be ready for this fall's DNP, DPP and GEC meetings.

"It will electronically deliver the abstracts and the agenda," said Sara Conners, Web Manager at APS. "We're hoping to cut down on printing costs in the future."

APS is contracting with CrowdCompass, an online app developer with over 100 apps already available for iPhones and Android phones. CrowdCompass specializes in apps for meeting attendees, and has developed them for Pittcon, the largest annual conference for the laboratory sciences, as well as for the New

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Ohio High School Hosts APS Artwork

Artwork commissioned by APS for the World Year of Physics in 2005 has found a new home in southern Ohio. "A New World View" was presented to North Adams High School in rural Seaman, Ohio at a small ceremony on September 13. In the photo at the ceremony are (l to r): APS Head of Public Outreach, Rebecca Thompson; North Adams science teacher Randall Dunkin; Spanish teacher Olga Cruz; school principal Greg Grooms; and Stephen Caraway, a representative from the office of Congresswoman Jean Schmidt (R-OH).

The school requested to host the art because many images used in it are of students who went to the high school.

The World Year of Physics marked the 100th anniversary of Albert Einstein's "miracle year" when he published three papers that revolutionized much of physics. The work had previously been exhibited at Brookhaven National Lab, at the Maryland Science Center in Baltimore, and at the APS editorial offices in Ridge, NY.

Created by the Washington Glass Studio, the artwork consists of four tall panels, each containing eight transparent blue glass panes. Each pane features a relief sculpture depicting an aspect of Einstein's life or an application of his work, such as dice representing the randomness of the universe, or a trio of violins, the instrument he loved to play. Behind each pane is a photo of a child

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Imprisoned APS Member faces Harsh Treatment and Charges in Iran

By Michael Lucibella

Last month, *APS News* reported on the jailing of a University of Texas at Austin physics student in Iran. Since then, new details have become available and some new developments have occurred.

Physics student and APS Member Omid Kokabee remains imprisoned in Iran, facing charges of crimes against the Iranian state. He has been held in solitary confinement in Iran's notorious political prison for over a month, has faced various forms of psychological abuse, and has been charged with attempting to subvert the government of Iran.

Kokabee, who is a native of Iran, is a first-year graduate student studying optics at UT Austin. He was arrested in January at Khomeini Airport while waiting to board a plane to return to the United States. He had travelled to Iran to visit his family over winter break.

Omid Kokabee

People close to Kokabee were shocked to hear about his arrest. They said that not only has he never committed any action to subvert the Iranian government, but also he has never been involved with politics either inside or outside of Iran.

"The sad thing about Omid is that he is not a political activist," said a friend of his who asked to remain anonymous because he has family living in Iran. "He's a student in physics… He was never into politics, he was never a member in any political group or anything."

The graduate student advisor at

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Posting Meeting Slides Online Gains Strong Acceptance

At the 2011 April Meeting in Anaheim, the APS Committee on International Affairs (CISA) conducted a trial of the usefulness and acceptance of online slide presentations by providing internet access to speakers' slides from a broad cross-section of plenary, scientific and general-interest sessions. Slides were uploaded by speakers throughout the meeting and in most cases available immediately after their talks. The talks were chosen to appeal to a diverse audience. CISA advertised the trial to physicists worldwide, including those who were not yet APS members.

The slides were posted online to better serve those members who cannot travel to APS meetings, especially those living outside of the United States (comprising nearly 25% of the non-student members). To help disseminate the information presented at the April Meeting CISA also conducted an online survey of those who viewed the presentations.

Preliminary analysis of the statistical information reveals that there were more than 39,000 page hits, and in excess of 7,000 talk downloads (nearly 7 times the number of attendees at the April Meeting). The plenary talks were each downloaded more than a thousand times–indicating the highest interest from viewers.

CISA will continue to refine these preliminary data, examining from which regions physicists downloaded the talks, the number of unique IP addresses, and other information that will give insight regarding the interest in online slide presentations.

In addition to collecting data from the web hits, CISA created a voluntary web survey linked to the online presentations website, which was used to capture statistics and to solicit comments and feedback. The detailed data and comments that were collected through this survey indicate:

- Nearly 97% of respondents would find online talks at APS Meetings useful
- 95% believed that online APS presentations could (or definitely would) enhance the research or professional development of their students and postdocs.

These data are taken from a report, *Online Talks at the APS April Meeting 2011: A Report from the CISA Trial*, prepared by CISA Chair Karsten Heeger, Chair of the Forum on International Physics Harvey Newman, and APS Director of International Affairs Amy Flatten. The report will soon be available on the CISA web page at http://www.aps.org/about/governance/committees/cisa/

Some of the most important feedback came from survey respondents' written comments,

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Members in the Media

"Just get involved, the country needs your expertise, your analytical thinking and your approach to issues… If you can learn nuclear physics, you can learn politics."

***Vernon Ehlers**, urging scientists to get more involved with politics,* The New York Times, *August 8, 2011.*

"The scientific establishment holds [political involvement] against a scientist to some extent."

***Rush Holt**, urging scientists to get more involved with politics,* The New York Times, *August 8, 2011.*

"The comic-book picture somehow comes to life and speaks with the voice of the real Feynman…the best example of this genre that I have yet seen with text in English."

***Freeman Dyson**, the Institute for Advanced Study, quoted from his review of the graphic novel "Feynman" in June's* New York Review of Books, USA Today*, August 9, 2011.*

"It was a big deal… If you could enrich with lasers, you could cut the cost by a factor of 10."

***Ray E. Kidder,** Lawrence Livermore National Lab, on the international race to develop laser uranium enrichment,* The New York Times*, August 20, 2011.*

"What this means is that by the end of this year, not next year, we will definitely know whether or not the Higgs Boson as predicted by the Standard model exists."

***Richard Ruiz,** University of Wisconsin-Madison, on the recent announcement by CERN that they expect to find the Higgs Boson by Christmas,* BBCNews.com*, September 1, 2011.*

"The amazing thing is that the behavior remains the same across asset classes and across different time scales… The empirical law characterizing market trends [the findings of this research] is valid for FX futures as well."

***Tobias Preis**, Artemis Capital Asset Management, on his work finding a correlation between the number of times a company's name is googled and the frequency its stocks are traded,* The Wall Street Journal Online*, September 7, 2011.*

"The first time I came here was 1989… I remember sort of coming to this point and looking and saying, 'Wow, that's really a big machine!'"

***Dmitri Denisov**, Fermilab, reminiscing about the Tevatron,* NPR*, September 6, 2011.*

Physics Enrollments Set Records

Some readers may remember, perhaps nostalgically, the bountiful days of 1999, when, in the latter years of the Clinton Presidency, the US economy was booming and the federal government was running a surplus. However, 1999 also saw the culmination of a decade of declining enrollments in physics at the college level.

Fast forward to data from the Roster of Physics Departments, 2010, just published by Patrick Mulvey and Starr Nicholson at the Statistical Research Center of the American Institute of Physics. According to the report: "Academic year 2009-10 produced more physics bachelor's and more physics PhDs than in any other year in US history. The 6,017 physics bachelor's degrees earned in the class of 2010 represent a 65% increase from the class of 1999 eleven years earlier. The 1,558 PhDs in the class of 2010 is up 43% from a recent low 6 years earlier. Non-US citizens comprise 53% of the physics PhDs in the class of 2010."

In a companion report on astronomy, Mulvey and Nicholson note that "the 382 astronomy physics bachelor's degrees earned in the class of 2010 represent a 19% increase from the previous class and an increase of 89% from a decade earlier."

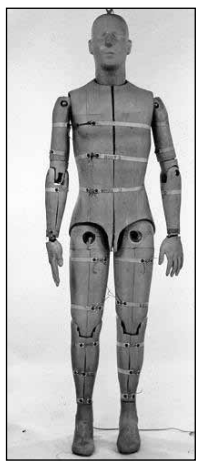
Is there a reason for the apparent counter-cyclical correlation between economic activity and physics enrollments? The authors do not speculate. More information, including a breakdown by institution, can be found on the AIP website at http://www.aip.org/statistics/.

This Month in Physics History

October 21, 1914: Birth of Samuel W. Alderson, inventor of the crash test dummy

The dubious distinction of being America's first automotive casualty belongs to Henry Bliss, who stepped off a New York City trolley in 1899 and was struck and killed by an automobile. More than 20 million people have been killed in car accidents since then, and that number might well have been higher were it not for the ingenuity of a physicist named Samuel Alderson, inventor of the crash test dummy.

Alderson was born in Cleveland, Ohio, on October 21, 1914 and grew up in California. His father, a Romanian-born immigrant, owned a custom sheet-metal and sign shop. Alderson finished high school at 15 and periodically attended several colleges, including Reed College, California Institute of Technology, and the University of California Berkeley. His education was interrupted by stints of working in the family sheet-metal business. He pursued a PhD in physics at UC-Berkeley under J. Robert Oppenheimer and E.O. Lawrence, but never finished his dissertation.



Instead, he developed tiny electric motors for missile guidance systems during World War II, then went to work for IBM, where his research included designing a motor-powered prosthetic arm. Based on this work, he founded his own company in 1952, with a contract to design an anthropometric dummy to test the safety of the ejection seats used in aircraft. The automotive industry was also interested in such a dummy, as the number of traffic fatalities continued to rise.

The field of biomechanics was still brand-new, with no reliable data on the effect of sudden violent forces on the human body–and no good tools with which to measure such impacts. Researchers at Wayne State University in Detroit started experimenting using cadavers from its medical school–usually elderly white males. They placed accelerometers on the cadavers and strapped them into cars to study the impact on the bodies of head-on-collisions and rolling.

A handful of hardy souls volunteered to serve as living crash test dummies in the late 1940s by strapping themselves into rocket sleds to test the effects of rapid deceleration on the body, and by allowing themselves to be pummeled in the chest with heavy objects, and sprayed with shattered glass. These included Colonel John Stapp, for whom the annual gathering of car-crash testers is named, and Wayne State professor Lawrence Patrick. Patrick claimed the tests (while painful) were crucial to the development of the earliest mathematical models used in the field.

Later, live animals were used to collect data on survivability. Pigs were particularly well-suited to the task, since their internal structure was similar to that of humans, and they could be placed in a sitting position inside a vehicle.

Those tests, while controversial, provided the anatomical models needed to design the first crash test dummies–and also led to design changes in vehicles that have saved thousands of lives. A 1995 article in the *Journal of Trauma* by Albert King estimated that about 8500 lives each year are saved as a result of such research. In fact, for each cadaver used, nearly 300 people survived what would otherwise have been fatal crashes.

Yet those early models were imperfect, in part because no two cadavers were alike, making it difficult to collect reliable comparative data. An anthropometric test dummy (ATD) that could be mass-produced, tested, and re-tested, would address this fundamental flaw.

That was Alderson's task when he founded his company. The first such dummy was dubbed "Sierra Sam," introduced in 1949 to test aircraft ejection seats, aviation helmets, and pilot safety harnesses. In 1968 he produced the V.I.P., designed for automotive testing. It had a steel rib cage, articulated joints and a flexible neck, with cavities to hold instrumentation, and was designed to mimic the acceleration and weight distribution properties of an average male.

By the 1970s, General Motors scientists had entered the market, introducing the Hybrid I, combining aspects of Alderson's original design with that of a competitor, Sierra Engineering. This was quickly followed by the Hybrid II and Hybrid III, with improved neck flexibility and head rotation to more closely simulate that of a human body.

The latter has been the industry standard since its introduction in 1977, expanding from just an average male dummy to include an entire "family." It incorporates several sensors at key points on the "body," to measure such things as the torque on the neck in response to a collision, or how much the seat belt compresses the chest.

The Hybrid series was designed specifically for frontal impacts, so there are now models of crash test dummies to measure the impact of other situations as well. These include the Side Impact Dummy (SID), to measure what happens to the ribs, spine and internal organs during side collisions: BioRID, to study the impact of rear collisions, particularly whiplash injuries; and CRABI, to study the effectiveness of seat belts and air bags on children.

One of the most advanced crash test dummies to date is WorldSID, capable of recording 258 separate measurements in a single crash test. But manufacturers continue to make improvements, such as RibEye, a prototype from Denton ATD, with LEDs on each of the dummy's 12 ribs that can then be tracked by light-angle sensors, thereby measuring movement in all three dimensions.

Alderson went on to create humanoid figures dubbed medical phantoms, designed to measure radiation exposure, as well as synthetic wounds worn by soldiers during training exercises, capable of oozing fake blood. But it is his contribution to automotive safety, in the form of the crash test dummy, that has saved the most lives and become an icon of popular culture. Alderson died peacefully at home in Los Angeles on February 11, 2005, at the ripe old age of 90.

Further Reading:

Guizzo, Erico. "Anatomy of a Crash-Test Dummy," *IEEE Spectrum*, October 2007.

Roach, Mary. *Stiff: The Curious lives of Human Cadavers*. New York: W.W. Norton, 2003.

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Science Journalist Shares Her Love of Physics

Ed. Note: *Each year, as part of a program run by the American Association for the Advancement of Science, APS sponsors two media fellows, who spend the summer at a media outlet, learning the craft of science writing. Sometimes this leads to a career in journalism; sometimes it produces a scientist with a more nuanced understanding of how the media operate. In the following article, one of the 2011 APS media fellows, Sophie Bushwick, recounts her experience. A second article, by media fellow Helen Chappell, will appear in the November issue.*

In college, I started to hate telling people my major. The first time someone responded, "Oh, you must be so smart–I could never understand physics!" I thought it was a compliment. The tenth time, however, I realized that they weren't praising me so much as dissing the science that I love. I began defending physics, gushing about the latest concept I'd learned and trying to convert my audience into physics lovers.

To me, science journalism is just another way for me to share my physics enthusiasm. Another perk was that science writers get to learn about and communicate a wide variety of topics rather than specializing in any single subfield. While my fellow majors were applying to graduate school, I was applying for a AAAS Mass Media Fellowship. I was delighted to find

Sophie Bushwick

out that I got a fellowship at *Scientific American*, thanks to sponsorship from APS.

As I learned, I wouldn't be writing for the magazine but for the *Scientific American* website. Although it might have been cool to see my name in print in the physical magazine, I found that the internet let me communicate science in a variety of new ways. Of course, the website is a forum for articles from the magazine, and additional news articles written by the online staff and freelancers. But I also got to write more casual blog posts illustrated with photos and videos. I recorded short, pun-filled podcasts for subscribers who like to listen to their news. For image galleries, one of my favorite types of assignment, I found beautiful photos of stars, molecules, and spider webs and wrote extended captions explaining the science behind them.

All summer, I started my morning with a hunt for new story ideas. Next, the online staff met to pitch stories and discuss what everyone would be working on, and then we dispersed to do research, write articles, and make science news. Not all of that sharing was limited to the website. Today's science communication has also moved into social media. On Facebook and Twitter, I provided links to the science stories I wrote and the ones I read. Being part of the *Scientific American* online staff was wonderful not only because I got to learn about new discoveries, but also because those I found new ways to share them.

Science communicators have more tools than ever before with which to encourage their audience

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INSIDE THE BELTWAY

Summer of Discontent

by Michael S. Lubell, APS Director of Public Affairs

By almost any measure, Americans are in a monumental funk. And they have good reason to be. They've seen their incomes sink, their jobs vaporize and their homes go "underwater." Here are some of the stunning figures.

A few weeks ago the Census Bureau reported that in 2010, 46.2 million Americans were living in poverty–the highest count in 52 years of reporting. The poverty rate, now at 15.1 percent, rose faster during the last three years than in any other three-year period since the early 1980s. And between 2009 and 2010, median income fell 2.3 percent.

Bad enough? Here's more: joblessness remains stuck at 9.1 percent with another 7 percent of workers either underemployed or filling part-time positions, and nearly a quarter of all homes are worth less than their mortgages.

So when Congress took five weeks off starting in early August, and the president took his family and golf clubs to Martha's Vineyard to escape the sultry capital, Americans were left steaming. In the first eight months of the 112th Congress, about all official Washington had done was engage in brinksmanship. At least, that's how the public saw it then, and it continues to do so today.

True, House Republicans had cleaned up the Democrat's budgetary mess left over from the 111th Congress, but only after they had made it clear they were willing to shut down the government if they didn't get their way. A few months later, in a fight over raising the debt limit, the Tea Party, using a grit and grind tag-team strategy, nearly forced the nation to miss payments on its loans and budget obligations, in the process, virtually tying the hands of House Speaker

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Physicists Take the Plunge as Entrepreneurs

By Alaina G. Levine

A cabal of cacophonic college kids inspired Shahriar Afshar to become an entrepreneur. It was 2004, and the physicist was serving as a visiting professor at a college, temporarily residing in the dorms. "It was summer, and the kids loved playing video games and listen[ing] to loud music, which shook the whole building. At the time I was in a fierce fight with colleagues, and writing response papers to their critiques of my work, and had to find a way to allow the kids [to] enjoy their games without shaking me out of my wits!"

Afshar "gave it a few hours of thought" and came up with a winning idea that would give people the opportunity to essentially "feel" the sensations of video games and music without the noise. The device, which he named KOR-fx, and around which he eventually formed the company Immerz, Inc., is worn over the chest and uses haptic feedback. Pulses from the apparatus "sync" up with audio waves, sending low-frequency vibrations into the chest cavity, giving the user the sensation of "rain, wind, bomb blasts, or the quaking of T-Rex's footsteps in Jurassic Park," according to a recent article in *Delta Sky Magazine.* In addition, the unit allows users to feel the bass line in music without "cranking up the stereo." KOR-fx debuted to rave reviews at the 2010 Consumer Electronics Show, and has been featured in *Popular Science* and *Cnet* as a way to experience music, television, and gaming in "4-D". "Frustration was indeed the mother of this particular invention," writes Afshar, who still holds a faculty position at Rowan University.

Andrew Leker, who received his bachelors in physics from the University of California at Berkeley, is another entrepreneur whose arena is gaming. Currently the CEO of Electrified Games, Inc., Leker has been obsessed with video games and programming since he was in 7th grade. When he was a junior in college, he and his sister formed a publishing company and started selling role-playing books that he designed and wrote. He was so focused on his business, that when a professor asked him if he wanted to work in his lab, Leker declined and the faculty member "looked at me like I was crazy," he says.

Shahriar Afshar

Andrew Leker

Edward Flynn

After graduation, rather than pursue an advanced degree, Leker immersed himself completely in the company, despite the fact that "we were good at the games, but not business and we were not financially sophisticated," he notes. But his brother-in-law, one of the founders of Autodesk, partnered with him to form a software development company based on the books he had been penning. Leker labored for five years to design and program the game that eventually became the flagship of his new enterprise, Electrified Games. In 1994, the video game, called Alien Logic, was published and was named the Best Role Playing Game of the Year by *E3 Magazine.*

Today, Electrified Games has 33 full-time employees and focuses on producing games for various brands such as Disney, Pokemon, Visa and the NFL, for various platforms such as Facebook and mobile devices.

Like Afshar, Leker, and many other entrepreneurs, Edward Flynn, a nuclear physicist who worked at Los Alamos National Laboratory for 38 years, saw a problem and knew his unique skill set could help conquer it. His wife was diagnosed with breast cancer and he pondered whether he could develop a better detection tool using nanoparticles and magnetic sensors. He created a technique in which a patient is injected with iron oxide nanoparticles coated with antibodies, which adhere to specific cancer cells present in a tumor. The patient is then subjected to a small magnetizing field that aligns the metal nanoparticles and when the field is discontinued, the nanoparticles emit a magnetic signal. This emitted signal is detected by superconducting quantum interference device (SQUID) sensors. The resulting signal measurement can show doctors "how many metal particles, and therefore how many cancer cells, are present, and where in the breast they are located," according to a recent article featuring Flynn by Shirley S. Wang in *The Wall Street Journal*.

Since Flynn's innovation requires only a very small number of cancerous cells to be present, approximately 100,000, as opposed to several million cells needed for a mammogram, it allows tumors to be detected much sooner. "The system can detect a breast cancer tumor with 100% accuracy up to three years earlier than a mammogram can," he states. It also enables treatment to be monitored more closely, as the number of cells present can be measured to assist the doctor in the detection of metastasis.

Flynn first fiddled with magnetizing coils in his garage, and eventually applied for a Small Business Innovation Research (SBIR) Grant, which is overseen by the US Small Business Administration. The SBIR program is designed to foster high-technology innovation and economic growth and is a common early funding source for technology-driven ventures. "When I got the funding, I realized this might work, based on all the physics I knew," he recalls. He founded a company, Senior Scientific LLC, in 1998 to begin the process of advancing the idea, and serves as its CEO. He is now working with Manhattan Scientifics to commercialize the technology and bring it to market.

Although the idea of having your own company or product line can be tantalizing for anyone, for physicists, there can be many surprises. "As an academic, your world of interactions is fairly well-defined, and tasks are pretty routine," notes Afshar. "As a businessman who also leads the R&D side, one minute you are solving multi-cavity resonance equations, and the next Skyping with an Asian manufacturer, all the while being cognizant of fundraising for the next phase of the expansion. Super-multitasking was initially a major challenge, but it seems I've got the

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Letters

Readers interested in submitting a letter to APS News ***should email letters@aps.org.***

Scientists Should Get Active Now

Thank you for Michael Lubell's "Inside the Beltway" column in the July 2010 issue. I have noticed that many in the liberal-leaning world of academic physics tend to blame the problems facing the funding of scientific research solely on Republicans. The article emphasizes that the biggest challenge facing the funding of science is not enmity from Republicans or Democrats but rather bipartisan neglect. As scientists, we have a responsibility to the taxpayers that fund our research to engage the public in an honest discussion of what benefits come from our research. If we want to be a priority when federal funds are scarce and deficits are high, we need to vocally demonstrate how we can help to solve some of the challenges facing our country. Our work is extremely valuable and worthy of tax-payer funds, but, as Congresswoman Pelosi was quoted to have said "great damage will be done" to science unless we "get active now." Opportunities to get active exist on almost every college campus and through nonpartisan organizations such as the Scientists and Engineers for America (www.sefora.org). If we don't make a community-wide effort now there will be much less of a community to make such an effort in the future.

Nicholas Nelson
Lafayette, CO

Wrong Party Credited with Surplus

The heading "Lubell Column Brings Out Partisan Divide" under the Letters Section of the August/September 2011 issue is certainly illustrated by the letter from Felix Smith. He states, "As scientists it is our business as it is our natural inclination to look toward facts and to question common perceptions and sloganeering." Therefore, I am sure he will appreciate the collegial correction that it was actually Clinton and the Republicans who left the treasury with a healthy surplus.

Chet Sullivan
Cordova, IL

Ed. Note: *The Republicans controlled both houses of Congress during the last 6 years of the Clinton presidency.*

Kelvin Undervalued in Poll

In response to the letter from Henry R. Lewis (May *APS News*), asking about rankings of physicists, I do not know of such lists in an APS journal circa 1949. However, in 1999, the Institute of Physics publication *Physics World* conducted a poll asking responders to rank the top five physicists. [***Ed. Note:*** *this can be accessed at http://physicsworld.com/cws/article/print/851*]. Noteworthy is that Lord Kelvin, who was widely regarded as the top physicist at the end of the 19th century, did not receive any votes for the 1999 list. I submit most physics professionals today routinely use Kelvin's many fundamental contributions unaware of their source. In contrast, Maxwell acknowledged his debt to Kelvin in his Treatise.

"O quam cito transit gloria mundi." (Thomas à Kempis, 1418)

George R. Bart
Chicago, IL

Correction

In the August/September Back Page by Rush Holt, it is stated that "We [i.e., America] discovered penicillin." This is incorrect. Many people were involved in the discovery of penicillin, including Nobel laureates Alexander Fleming, Ernst Chain and Howard Florey, none of them American. America did pioneer the mass-production of penicillin during World War II, which resulted in the saving of many lives.

We thank Zhang Li and Leonard Finegold for pointing out this error.

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which highlighted the diversity of physicists whose schedule or finances prevented traveling to the meeting, but who now may participate in APS meetings through access to online materials. This was particularly relevant to members in industry, members living outside of the United States, and student members. Additional comments suggest that meeting attendance is not at risk–this capability broadens participation by those who often could not attend in person.

Heeger stated his belief that the trial results clearly indicate a strong interest from the physics community in accessing APS meeting materials online. He noted that the number of downloads far exceeded the number of in-person attendees and that survey respondents also underscored how these talks could be beneficial to their professional development.

"Online access to APS meeting materials will enable participation of physicists worldwide in APS meetings, and will serve the Society's mission to 'advance and diffuse the knowledge of physics' " he said.

The online meeting materials are still available for viewing at: http://www.physics.wisc.edu/APSApril2011.

Entrepreneurial Innovators in Tough Situation

"We should prepare entrepreneurs and not only good employees."

This very important concept is the last sentence in a Letter in the August/September *APS News* from A. Christian Silva.

It was always clear to me that education was primarily oriented to teach students to OBEY and FOLLOW, even at the highest PhD level. But entrepreneurial innovators (not followers) have primarily driven modern society. Later, industrial research labs nurtured those innovators, but now that industrial research environment has mostly disappeared in the US due to extreme greed and incompetence by industrial leaders. Simultaneously, the US government (under fanatical influence from Tea Party folks and conservative Republicans) is also destroying its innovative research efforts. This pitiful situation is described in the same *APS News* issue on The Back Page by Rush Holt in "Developing a National Innovation Strategy."

Meanwhile, other countries have been and are now making very substantial commitments to education, research and innovation that is paying rewards for them at the expense of the US. For the US to regain its leadership position will be difficult since modern hardware innovation and development requires substantial expensive equipment, money, time, manpower and resources. Individual entrepreneurial innovators face a tough uphill battle. What a mess!

Chuck Gallo
Lake Elmo MN

Scientists Need to Deliver the Message

The Back Page article on "Developing a National Innovation Strategy" by Representative Rush Holt in the August/September *APS News* delivered a much-needed message. It is good to have a physicist serving in the Congress. I am blessed with being represented there by the only PhD chemist, John Olver, and I welcome this much-needed scientific input to balance that from several who deny science and depend upon ideology. Unfortunately, many legislators and the public do not hold science in high regard, possibly related to their own inadequate science education provided by teachers who teach it as an abstract subject rather than stressing its importance to our lives. It is not widely appreciated how much of the quality of our lives arises because of past scientific developments and to how much our future may depend on those to come. More of us need to be involved in conveying that important message. Our future may depend upon it!

Richard S. (Dick) Stein
Amherst, MA

Stop the Political Rhetoric

The Back Page article by congressman Rush Holt in the August/September *APS News* is a naked political ad. Where Holt's discussion is not partisan ("Tea Party members are calling for…"; "…hostility to the president's vision…"; etc) it is outright self-serving ("I helped establish…"; "I offered an amendment…"; "I worked to address…"; "I successfully offered…"). Nowhere does he mention the overriding issue of trillion dollar deficits as far as the eye can see and the need for balancing priorities to get our fiscal house in order.

The physics community wants and needs articles that address its political interests. It has the right to expect those articles to rise to a level of intellectual honesty and rigor appropriate to the organ of a great and historic professional society. Whistle stop political campaigning doesn't cut it.

Carm Catanese
Rocky Hill, NJ

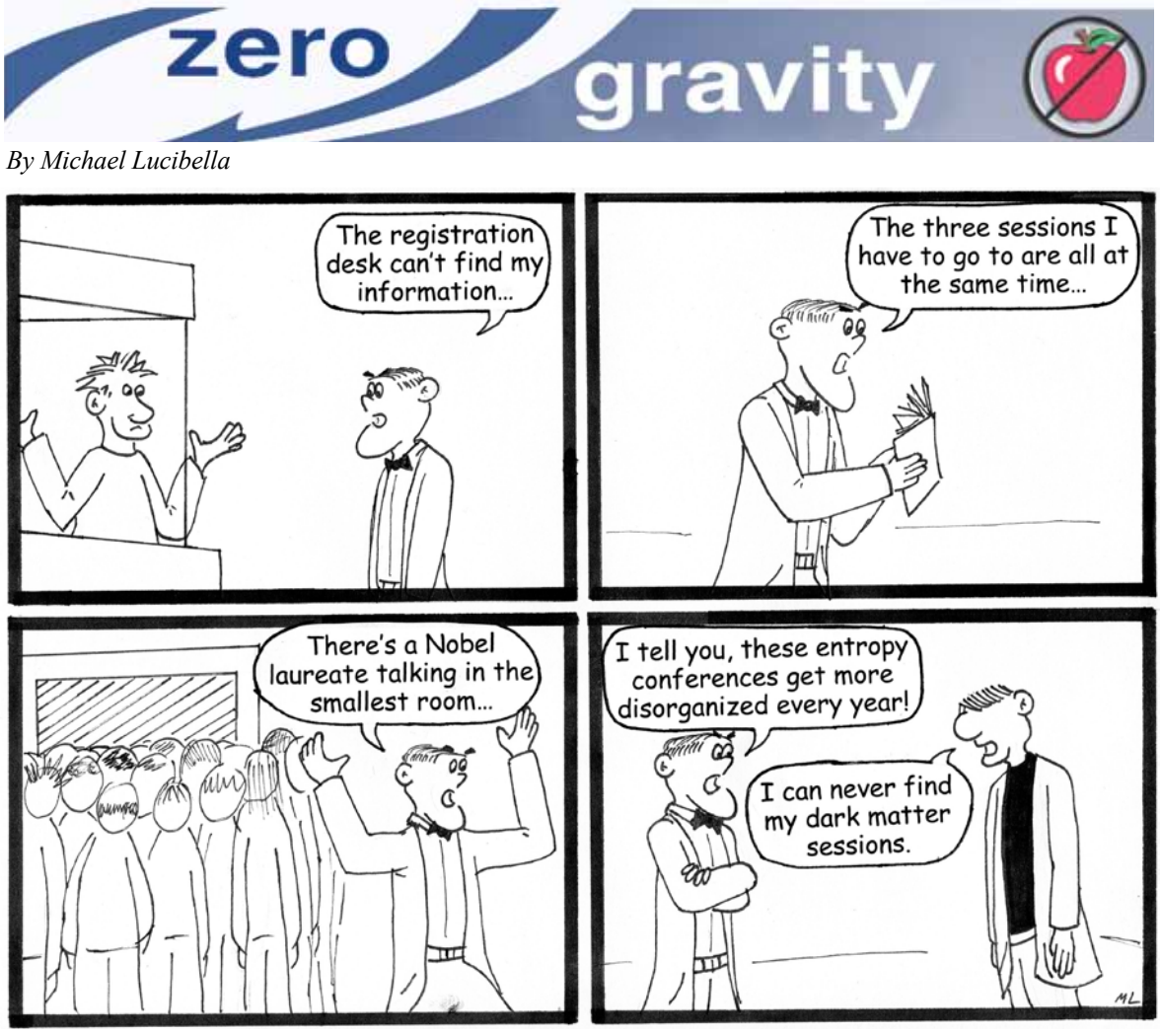
Must Get at the Root Causes

In his Back Page in the August/September issue, congressman Rush Holt, a fellow physicist, appears to sometimes cite symptoms, not the root causes. It is not guaranteed that the United States will always be #1 in R&D. Knowing that, the question has to be asked if going back to yesterday's way of doing business would assure being in a #1 position.

Like many politicians, Holt argues that political measures would assure things like jobs, a growing economy, top notch R&D, domestic contentment, etc. What is not realized is that prices are set by the pool of consumers, not by politicians. They are only affected, not set, by "regulation" (and other factors too).

Unfortunately, many politicians believe that wants, behavior and actual history are the same thing and are constant in time (until becoming obsolete). Real life is not that way, however. The congressman should know that the regulation of things (like light bulbs, R&D funding, money in general) only constitutes a "crutch" for improving things. Real progress can only be made when people are changed. Too many "benefit of hindsight" arguments are used by all politicians. If a factor for something undesirable is blamed that is not the root cause, little progress may be had from altering it. There remains the ultimate dilemma of science: Does one want to say what is acceptable or what turns out to come true?

Bolko von Roedern
Golden, CO



By Michael Lucibella

Education Corner

A column on educational programs and publications

APS Webinars Introduces New Series
The first "APS Webinar Conversations" broadcast will be on October 25 at 3 p.m. Eastern. The discussion will be on Graduate Study Abroad with Mike Walock. The webinar URL is: www.aps.org/careers/guidance/webinars/gradabroad.cfm

Upcoming PhysTEC Meetings and Request for Proposals
2011 Colorado Learning Assistant Workshop
A workshop on the CU Boulder Learning Assistant (LA) program will be held Nov. 2-3 in Boulder, CO. The LA workshop will show how peer instruction can improve undergraduate education while enhancing recruitment to physics teacher education programs. For more information or to register, visit www.ptec.org/conferences/cula11

2011 PhysTEC Request for Proposals Coming Soon
The Physics Teacher Education Coalition (PhysTEC) project is planning to release a request for proposals for new sites to develop model physics teacher preparation programs, beginning in the 2012-2013 academic year. Proposals are solicited for two types of sites:

- *Comprehensive Sites*-Receive up to $100k per year for three years. These sites will implement the full PhysTEC program.
- *Focused Sites*-Receive up to $25k per year for three years to implement specific elements of teacher preparation programs
- *Applying*-Institutions wishing to apply must submit a pre-proposal. More details will be posted on the PhysTEC website by early October. Minority-serving institutions are strongly encouraged to apply. Visit www.phystec.org for more information.

2012 PhysTEC and AAPT Winter Conferences - February 3-4 in Ontario, Calif.
The 2012 PhysTEC Conference will occur in conjunction with AAPT's annual winter meeting in Ontario, California on February 3-4, 2012. The conference is the nation's largest meeting dedicated to physics teacher education. It features workshops, panel discussions, and presentations by national leaders, as well as excellent networking opportunities.

2012 Professional Skills Development Workshops for Women
APS, with support from NSF, will host two Professional Skills Development Workshops in 2012 for female physicists. Postdoctoral associates and senior-level faculty and scientists are invited to apply for the February 26, 2012 workshop in Boston, MA. Postdoctoral associates and early-career faculty and scientists are invited to apply for the March 30, 2012 workshop in Atlanta, GA. Senior graduate students are also welcome to apply.

Applicants affiliated with a US institution/facility are eligible for travel and lodging funding consideration. Those needing funding assistance are encouraged to apply early. The deadlines for the workshops and a link to the online application can be found at: www.aps.org/programs/women/workshops/skills/

Childcare Grants for APS Spring Meeting Attendees
Small grants of up to $400 are available to assist attendees of the APS March and April Meetings who are bringing small children or who incur extra expenses in leaving them at home (i.e., extra daycare or babysitting services). The deadlines for the grants and a link to the online application can be found at: www.aps.org/programs/women/workshops/childcare.cfm

Funding for Undergraduates to Attend APS Meetings
A limited number of $200 and $1000 travel supplements are available for undergraduate students presenting at the 2012 APS March and April Meetings. Students must submit their abstracts by the meeting deadlines, which are November 9 for the March Meeting, and January 6 for the April Meeting. Students will also be invited to take part in Future of Physics Days (FPD), which include special events that are planned over the course of the meetings to enable undergraduates to meet their peers, share their research results with other physicists, and begin building a network among fellow physicists. A description of the program and awards, including eligibility requirements, is available at the FPD website: www.aps.org/programs/education/undergrad/students/futurephysics/travelgrants.cfm

Concerted Effort Underway to Save Webb Telescope

By Michael Lucibella

The James Webb Space Telescope, billed as the heir to the hugely successful Hubble Space Telescope is facing serious problems. It's way over budget and years behind schedule. However, the House of Representatives' recent action to cancel the project prompted an outpouring of support in the science community that may have saved the project. Two months after the House zeroed out funding for the telescope, the Senate voted to restore it.

As these events were playing out, on August 1 the APS Executive Board issued a statement calling on Congress to continue to fund the telescope.

"The Board expresses particular concern and dismay that impending House action on appropriations for Commerce, Justice, Science and Related Agencies has already identified the James Webb Space Telescope (JWST) as a prime candidate for termination," the statement read. "The APS rarely advocates for specific science projects, but it believes JWST deserves special attention, especially now."

In addition, APS vice-President Michael Turner, of the Kavli Institute for Cosmological Physics at the University of Chicago, published editorials in both *Science* and *Nature* calling for the telescope to be saved.

"The JWST can still be saved, and should be. The budget for 2012 is yet to be settled and there is a groundswell of support for the telescope: professional societies around the globe have issued statements of support, online petitions have been organized and influential commentators have called for its completion," Turner wrote in *Nature*. He added that he was concerned that, if not done properly, finishing the project could bankrupt American space sciences. "NASA must spread the additional cost across the agency so that it does not cripple the rest of US astrophysics."

In *Science*, Turner compared the Webb with the Hubble space telescope for its potential transformative role in observing the universe. He added that in adjusted dollars, the Hubble cost about $13 billion to build, not including its servicing missions, while the Webb is still projected to cost about $8 billion.

The JWST will be a tennis-court sized infrared telescope, one hundred times more sensitive than the Hubble. It will be located at a Lagrange point one million miles from Earth, and astronomers plan to use it to study the formation of early galaxies.

The telescope has had a troubled history of delays and cost overruns. When its final design was originally unveiled in 2002, NASA estimated that it would cost around $1 billion to fly the spindly telescope in 2010. This was an overly optimistic estimate, with tight budgets and delays continually pushing the launch date farther and farther back. In October of 2010, with a projected final budget of more than $5 billion, a review was commissioned by Senator Barbara Mikulski (D-MD) and chaired by John Casani of the Jet Propulsion Laboratory. It concluded that the telescope needed another $250 million in 2011 and 2012 to make its launch date in 2015. The money was not appropriated, NASA could not come up with the needed funds from its existing budget and the launch date continued to slide.

In July of 2011, the House Appropriations on Commerce, Justice, and Science released their budget for 2012, with all of the funding for the James Webb Telescope zeroed out. The fate of the telescope was not mentioned during oral debate in committee, but a press statement released at the same time explained the committee's decision.

"The bill also terminates funding for the James Webb Space Telescope, which is billions of dollars over budget and plagued by poor management," the statement read.

On August 16th NASA announced new budget and timetable estimates for the telescope. The agency put the cost at $8 billion to finish building the telescope by 2018, plus an additional $780 million for the first five years of operation. In addition, in order to minimize any damage to its other programs, NASA announced that the additional funding would be spread around several of its branches, rather than have its science branch absorb all of the costs. As it stands now, about $3.5 billion has already been spent on the project, and about three-quarters of the components have been either delivered or are being fabricated.

The Senate Appropriations Subcommittee on Commerce, Justice and Science announced on September 14 that it would act to supply funds to complete the telescope. It has several powerful allies in the Democrat-controlled Senate, including Senator Mikulski, chair of the Senate Appropriations subcommittee that oversees NASA's budget.

Other lawmakers, scientists and organizations have come to the imperiled project's defense. Representatives Steny Hoyer (D-MD), Donna Edwards (D-MD) and Adam Schiff (D-CA) had also issued statements critical of the funding cut. The American Astronomical Society issued a statement saying that canceling the project would cost more taxpayer dollars than it would save.

The appropriations bill still needs to be approved by the full Senate, and reconciled with the House version.

The New York Times published an editorial criticizing the cancelation in early July. Later, on August 26th, the *Times* published a letter to the editor written by John Mather, Nobel laureate and the project's senior scientist, and signed by 31 other Nobel laureates decrying the House proposal.

"Cancellation of the Webb, as a Congressional subcommittee has voted to do, would deal a fatal blow to large and ambitious space science missions for the foreseeable future, and would deny the public access to new and exciting images of the type that have captured the imagination of people of all ages," the letter read.

The Wall Street Journal printed a letter by Lawrence Krauss of Arizona State University in which he compared the possible cancellation of the Webb Telescope to the cancellation of the Superconducting Supercollider in 1993.

SUMMER continued from page 3

John Boehner, who until then had basked in his reputation as the quintessential deal maker.

Throughout the partisan bickering, all the president offered up was a plea that members of Congress begin acting like grownups and a complaint that he had been left at the altar when Mr. Boehner had refused to return his phone calls. His public posture led Hill Democrats and Republicans, alike, to chastise him for lack of leadership and voters to spank him with a job approval rating of 39 percent in the latest Gallup survey of 1500 adults.

Still, if polls are any indicator of relative discontent, the White House fares a lot better than Congress. Barack Obama's approval rating may be in the toilet, but congressional approval is in the sewer. It now stands at 15 percent, according to Gallup, with only 1 in 12 voters saying legislators deserve to be reelected.

Simply put, the average American is struggling to survive, fearful of the future and exasperated with elected officials–80 percent give thumbs down in answer to the question, "Is the country headed in the right direction?" They have lost faith in the institutions of government and the people who are charged with running them. Even though voters desperately want the President and Congress to work together to turn the economy around, they have little confidence in Washington's ability to do so. And it's their lack of trust in government that leads many of them to support the proposition that too much federal money is wasted on frivolous activities–scientific research prime among them, according to recent polling data.

In 1964, Lyndon Johnson declared a "war on poverty" and challenged Americans to build a "Great Society." Today, 47 years later, bureaucratic inefficiency, partisan gridlock and a corollary loss of public faith in government are quickly chipping away at Johnson's dream. And as the poverty rolls grow, I think back to a television show of the late 1950s and early 60s, hosted by Jack Bailey –a show, incidentally, media historians consider the precursor of today's reality TV.

With the help of an applause meter, the show's studio audience selected the winning contestant based on how pathetic it judged her life. And as the music of *Pomp and Circumstance* filled the sound stage, the victor, wearing a jeweled crown and a sable-trimmed robe, would assume her place on an ornate throne and sob uncontrollably as she listened to the list of prizes she was about to receive.

It was a mixture of schmaltz and pathos, but all America loved it, and the line Bailey used to open each show became a TV classic: "Would *you* like to be *queen* for a day?"

Bailey never had difficulty finding volunteers whose lives had unraveled and whose families were destitute. Today, once again, he would be flooded with takers.

Science isn't the panacea for the short-term misery, but it is the key driver of long-term economic growth and job creation. Getting that message across to the public won't be easy, but we must spend some of our time and energy trying.

JOURNALIST continued from page 3

to embrace science. Despite the decline of traditional print media, it's an exciting time to become a writer, and that's just what I intend to do. Because of the amazing experience I had during this fellowship, I'm embarking on a career as a freelance science journalist. My goal is to change the way people respond when I tell them that I majored in physics. Instead of replying that they just don't get it, I want my audience to say, "Oh, that sounds awesome–I love physics too!"

APS Announces New Minority Scholarship Recipients

APS recently announced this year's recipients of its Scholarship for Minority Undergraduate Physics Majors. Forty-one students from schools across America will receive financial support and mentorship as they pursue their physics degrees.

"It provides funding, mentoring, and the message that APS, a leading voice in the physics community, has confidence in the minority scholars' success," said Arlene Modeste Knowles, the scholarship administrator.

The first scholarships were awarded in 1980, with the intent to increase the number of underrepresented minority students in physics. The scholarships are open to students who are currently or planning to major in physics and are African-American, Hispanic American, or Native American US citizens or permanent residents.

"The scholarship shows that there are bright underrepresented minority students out there who, if given the proper mentoring and the assurance that they are as capable as anyone of succeeding as physics majors, will rise to the occasion," Knowles said.

Hands-on mentoring is a big part of the scholarship. Each student recipient is assigned a pair of mentors to help guide him or her through the first two years of school. One of the mentors is either a current or former member of the APS Committee on Minorities. The other is a member of the student's physics department who can be on hand as the student works towards a bachelor's degree. Part of the program includes one-on-one student meetings with the heads of their physics department. Knowles stays in close contact with the students as well.

"Mentoring is important because, if done well, it helps to provide the student an entrée into the larger community–in this case, the physics community; and from there, many opportunities open up for the students," Knowles said. "Additionally, mentoring helps students to navigate the educational pathway, allows them to open up about any vulnerabilities they may have, and helps them to realize that much of their path is remarkably similar for all students."

The scholarship is merit-based, and students are chosen by the APS Committee on Minorities based on the strengths of their grades, recommendations and outside research experiences.

One of this year's recipients, Natalia Guerrero, started last year at the Massachusetts Institute of Technology. In high school she bought a refracting telescope and took up stargazing as a hobby.

"I fell in love with looking at the sky and thinking about its mysteries," Guerrero said. "The questions astrophysics is trying to answer fascinated me and led me to choose to major in physics."

She said that the scholarship will help her not only pay for school, but also give her the support she needs to succeed as a physics student.

Stephanie Lona just started at the University of Illinois. After excelling in her two advanced physics classes in high school, she came to the University of Illinois to get her degree in physics. She said that physics is a subject that comes easily to her. She is captivated by the idea that it's everywhere.

"When I found out I received the APS Minority Scholarship I was ecstatic," Lona said. "It will greatly help in paying for college. Tuition is expensive and this scholarship is a tremendous help.

New Students

Brannan, Michael
Bulhosa-Solorzano, Daniel
Contreras, Daniel
Del-Castillo-Negrete, Carlos
Durrani, Haris
Guerrero, Natalia
Harrell, Takiyah
Hubbard, Xavier
Hunter, Christopher
Jenkins, Keonia
Johnson, Stephan
Levine, Marcus
Lona, Stephanie
Miller, Mark
Morales, Mario
Morrison, Akin
Nieves, Ashli
O'Donnell, Ryan
Orona, Lucas
Raives, Matthias
Reyes, Steven
Rodriguez, Victor
Rosa, Sabrina
Sharpe, Aaron
Zuniga Sacks, Alejandro

Renewal Students

Alexander, Ronald
Batie, Margo
Cook, Brent
Emerick, Andrew
Gray, Iris
Johnson, Carrine
La Placa, Rolando
Leu, Sarah
Martinez, Daniel
Ndousse, Kamal
Pardo, Kristina
Resendiz, Gustavo
Rodriguez, Roberto
Segert, Simon
Smarr, Olivia
Villar, Victoria

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peering through the relief, four of whom are students from North Adams high school.

"It served to be a really great vehicle to communicate to our students that they can reach out to other parts of the country and the world," said science teacher Randall Dunkin.

The school first got involved with the artwork when Dunkin heard about its call for photos and shared it with Spanish teacher Olga Cruz, an amateur photographer who was excited to participate in a nationally focused project that combined art and science. Four of Cruz's photos were used on the artwork itself and 88 were used on an accompanying poster.

"I think our students, when they see themselves on the poster, they think that by working hard they can fulfill their dreams," Cruz said.

Chase Burns was a freshman when Cruz snapped his photo. His image appears on the top left panel, behind a relief representing the computer chips made possible by Einstein's improved understanding of molecules and atoms. Today he is at Southern State Community College, has earned his associates degree in science and is looking to go into exercise science.

"Science is always what I've been good at really, so I decided to stick with it," Burns said, adding that he thought it was "pretty neat" that his image was included on the artwork.

When word spread that the artwork was going to be hosted at the school, about a dozen sophomore girls formed a focus group for those interested in going into STEM fields. Katrina Borchers is the director of the group.

"I think it's a really great honor to have it here," she said, adding that she hoped other students would take the time to understand its importance. She said that after graduating, she was interested in going to college to study physics.

APPS continued from page 1

York Comic Con.

The apps that APS plans on developing with the company will be primarily off-line, meaning that they will not have to be connected to the internet in order to run. The idea is that users will be able to download the entire meeting schedule about a week before each meeting. Internet connectivity in large conference centers is often spotty, so meeting attendees will still be able to use the apps when there is no Wi-Fi connection. When internet connectivity is available, the app will download any updates to the schedule.

"Smart phones are so prevalent it just seemed like a no-brainer," said Conners.

Scheduling apps released by APS last spring have been embraced by the membership. The March Meeting iPhone app was downloaded 2,306 times, a high rate for a meeting with 8,000 attendees. Similarly the app for the April Meeting, which had about 1,000 attendees, was downloaded 659 times. By the time of the DAMOP meeting in June, APS had expanded to include apps for Google's Android phones. All told, 281 people downloaded apps for the 1,000 person meeting. July's 600 person Shock Compression meeting had 208 downloads.

Conners said that APS's web department is also looking towards developing a single app that can be downloaded for all of its meetings.

IRAN continued from page 1

UT Austin, John Keto, echoed these sentiments.

"He loved physics and science and that's what he was concentrating on," Keto said. "There's no rational reason for his arrest, he's not a political person."

Kokabee received his undergraduate degree at the Sarif University of Technology in Tehran. After an initially unsuccessful attempt to get a student visa to come to the United States for graduate school, he received his master's degree from the Universitat Politècnica de Catalunya in Barcelona. It was then that he was able, with help from UT Austin to secure a visa to travel to the United States for his doctorate.

The reasons for his arrest are unclear. Several early reports indicated he might have been suspected of transmitting nuclear secrets to the United States. His colleagues and supporters have said that as a first-year graduate student in optics and photonics, he had neither the background nor the access to any nuclear secrets.

He's been formally charged with "communicating with a hostile foreign government" and receiving "illegitimate funds" from the United States. It's unclear where the charges stem from, as the Iranian government has not produced any evidence against him. Seemingly, coordinating with the State Department to get a visa into the United States would run afoul of the law. While at the University of Texas, Kokabee received the standard stipend for being a teaching assistant, which seems to be the basis of the second charge.

What is likely is that Kokabee has been caught up in the Iranian government's recent crackdown on students following the 2009 protests against the government. An unknown number of students and other citizens have been branded as political dissidents, imprisoned and subjected to harsh treatment to get them to confess to acts against the Iranian government. In addition, Kokabee is Turkmen, an ethnic minority in Iran that has faced particularly close scrutiny from the government.

After he was arrested, Kokabee was taken to the notorious Evin prison for political dissidents located in northwestern Tehran and held in solitary confinement for 36 days. During that time he was routinely threatened, abused and only allowed to see his family for three minutes. After that first month, he was moved to the general prison population, and permitted to see visitors.

Kokabee described the harsh interrogation techniques used against him to extract false confessions in an open letter addressed to the Iranian Minister of Justice, Ayatollah Sadeq Larijani, that was published in the Iranian news outlet *Kaleme*. According to the letter, interrogators made veiled threats against his family, especially against his father who recently underwent heart surgery. In addition they threatened to arrest any students and faculty members he had contact with if he didn't cooperate. To his interrogators, cooperation meant admitting to acts of subversion he didn't commit.

"Once I realized that when I write things which the interrogators like, or write things they dictate, pressure was reduced, and there was less abuse and mistreatment. I concluded to confess to things which pleased the interrogators," read the letter, as translated by Hossein Sadeghpour of the Harvard-Smithsonian Center for Astrophysics. "I did not know then how severe the consequences would become. I was at times threatened with execution. At other times, I was told that if I confessed to the allegations they wanted me to write down, I'd [be] with my family in two to three days and be permitted to leave Iran. I tried to please them."

Kokabee's fate in court is uncertain. He was originally scheduled to appear on July 15 to face the charges against him. However, at the last minute and without any explanation, his court date was postponed indefinitely. At press time, Kokabee is still waiting for his trial.

Like many of the actions of the Iranian judiciary, the reasons behind the postponement are unclear. Eugene Chudnovsky, one of the chairs of the Committee of Concerned Scientists, speculated that it was likely because of increased international attention.

"I tend to think that because of the big noise…the judge probably decided it would be safer for him to postpone the trial and wait to get word from the office of [Iranian Supreme Leader] Ayatollah Khamenei," Chudnovsky said.

When he does appear before a judge, it is likely to be Judge Abolghasem Salavat, who has become known around the world for presiding over several recent high-profile cases, including that of the two United States hikers charged with espionage, and those of numerous student dissidents connected with the 2009 protests against the government. He has earned the nickname "judge of death" for his harsh verdicts against political dissidents, including six death sentences.

Kokabee's family, friends and human-rights advocates hope that public attention to the case will bring international pressure on the regime to release him. As reported last month in *APS News*, APS's Committee on International Freedom of Scientists issued a letter on July 25 addressed to the Grand Ayatollah of Iran calling for his release, saying, in part, "We believe Mr. Kokabee's arrest resulted from a misunderstanding of his activities and urge that he be released to return to his pursuit of scientific endeavors at the University of Texas, Austin."

In early September, four leading optics societies, The Society for Optics and Photonics (SPIE), the Optical Society of America [OSA], the International Commission for Optics (ICO) and the European Optical Society of America (EOS) similarly drafted an open letter calling for his release.

"On behalf of the optical scientists and engineers from the 170 countries represented by the international organizations, we respectfully request that you consider allowing our colleague to return to his studies," the letter read.

ANNOUNCEMENTS

Senior Editor, *Physical Review B*

The American Physical Society is conducting an international search for a successor to the current Editor of ***Physical Review B*** **(PRB)**. The position is that of the **senior Editor of the journal**, responsible for editorial standards, policies and direction of the journal, and leadership of the staff of about 15 editors. *Physical Review B* is the largest and most comprehensive international journal specializing in condensed matter and materials physics and is the most highly cited journal in these areas.

The ideal candidate should possess many of the following qualifications: stature in field of research within the scope of PRB; stature in the PRB author community; experience with scholarly journals; management and interpersonal skills to deal effectively with an international array of authors, referees, and editors and with the APS; ability to continue to guide PRB in the online era; advocacy, integrity, and wisdom to lead the journal in responding to important matters and issues.

The Editor may maintain his/her present appointment and location and devote at least 20% of his or her time to the position. A higher level of commitment would be desirable in the initial year of service; several possible levels of long term commitment, from 20% up to and including full time, are possible.

The initial appointment is for three years with renewal possible after review. Salary is negotiable and dependent on time commitment. The desired starting date is 1 January 2012 or sooner. The APS is an equal employment opportunity employer and specially encourages applications from or nominations of women and minorities. The search is not limited to residents of the United States. **Inquiries, nominations, and applications should be sent by 1 November 2011** to: Sue Coppersmith, Search Comittee Chair, edsearch@aps.org.

APS Congressional Science Fellowship 2012-2013

THE AMERICAN PHYSICAL SOCIETY is currently accepting applications for the Congressional Science Fellowship Program. Fellows serve one year on the staff of a senator, representative or congressional committee. They are afforded an opportunity to learn the legislative process and explore science policy issues from the lawmakers' perspective. In turn, Fellows have the opportunity to lend scientific and technical expertise to public policy issues.

QUALIFICATIONS include a PhD or equivalent in physics or a closely related field, a strong interest in science and technology policy and, ideally, some experience in applying scientific knowledge toward the solution of societal problems. Fellows are required to be members of the APS

TERM OF APPOINTMENT is one year, beginning in September of 2012 with participation in a two week orientation sponsored by AAAS. Fellows have considerable choice in congressional assignments.

A STIPEND is offered in addition to allowances for relocation, in-service travel, and health insurance premiums.

APPLICATION should consist of a letter of intent of no more than 2 pages, a 2-page resume: with one additional page for publications, and three letters of reference.

All application materials must be submitted online by January 13, 2012.

http://www.aps.org/policy/fellowships/congressional.cfm

Reviews of Modern Physics

Colloquium: Quantum fluctuation relations: Foundations and applications

Michele Campisi, Peter Hänggi, and Peter Talkner

The foundations for the statistical approach to thermodynamics were laid by the likes of Boltzmann, Gibbs, and Maxwell in the 19th century. With the advent of quantum mechanics, in the beginning of the 20th century, theorists were forced to re-examine the issue under a new light. As a result, new terms such as decoherence and entanglement were introduced in the literature in order to make these foundations self-consistent. In this Colloquium, this fundamental topic is reviewed under the developments of the last decade, including the new field of nanoscience.

http://rmp.aps.org

Professional Skills Development Workshops

for Women Physicists

When:
February 26, 2012 -Boston, MA
March 30, 2012 -Atlanta, GA

Deadlines to apply:
November 18, 2011 (for Boston)
December 16, 2011 (for Atlanta)

Who may apply: Women postdoctoral associates and women faculty and scientists (early-career should apply for the April Meeting workshop; senior-level should apply for the March Meeting workshop).

First consideration will be given to applications received by the deadlines. Workshops will be limited in size for optimal benefits. Women of color are strongly encouraged to apply.

Participants may be eligible to receive a stipend to help cover the cost of travel and up to two nights lodging.

See http://www.aps.org/programs/women/workshops/skills/

Funded by a grant from the National Science Foundation

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hang of it now."

Starting your own company "is certainly a scary thing to do," notes Flynn, "but the rewards of using your knowledge for this purpose are great."

Edward Lipson, Professor of Physics and Kauffman Entrepreneurship Professor at Syracuse University, has experienced those rewards two times over. He is CEO of two companies, MindTel, LLC (founded in 1997) and SenSyr, LLC (spun off from MindTel in 2003). MindTel's main activity is in telemedicine and global humanitarian assistance. Recent projects involve disaster response and stability operations. The firm is supported by federal subcontracts and is currently active in Afghanistan, working with schools and hospitals to improve education, healthcare, and communications infrastructure, he says.

Lipson, whose background is in biophysics and whose current research involves medical imaging, explains that SenSyr's electronic interface technology was originally developed, under MindTel, as assistive technology for individuals with severe physical disabilities. "But now we are using the same approach in green and smart building technologies," he says, working closely with the Syracuse Center of Excellence in Environmental and Energy Systems. A true serial entrepreneur, Lipson co-founded, in April 2011, a third company, IndoorControls LLC, focused on environmental systems in buildings, to promote energy conservation and improved work performance and comfort.

For these entrepreneurs, a background in physics couldn't have been more helpful. "Physics provides one with the deepest level of understanding of natural processes," writes Afshar. "As theoretical physicists, we are used to coming up with hundreds of ideas and being an experimentalist allows one to test validity of those ideas. That's essentially what an inventor does. Of course, years of experience as a tinkerer helps enormously by having a good intuition as to what types of approaches may be more fruitful."

"The DNA of my company is solving some of the hardest problems in the industry," says Leker. And physics "was instrumental in helping me approach really hard problems."

Entrepreneurship is about risk and reward balance, Leker points out. "It means not always knowing how you're going to pay your rent or the salaries of your employees." So if you are going to take such a big risk, make sure it is for something about which you are very passionate, he warns. "My goal is to help people," says Flynn. "If all the things I've done can help cure cancer, that's my goal. I've put a lot of energy and time into this."

Successful entrepreneurship consumes the entrepreneur, not unlike how successful physics research consumes the physicist. "A physics professor should not just decide out of the blue to be an entrepreneur," cautions Lipson. "Learn about the risks and rewards of technology start-ups. Talk to other entrepreneurs. Have some innovative ideas and approaches, of course. Determine how best to balance and combine such activity with one's academic work." Stay abreast of the industry, trends, and competition, and know how to research and identify funding sources and networking opportunities.

You also must be knowledgeable about how the business and legal side of the enterprise functions, among many other tasks. "So much success is about who you know. I used to think this was bad–I actively didn't do it," admits Leker. But triumph in entrepreneurship is also about flexibility. "It requires a profound degree of adaptability," he says. But fortunately "physics creates the framework to be mentally adaptive."

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cally disadvantaged areas. In addition, several of the affected schools also historically graduate high numbers of female and underrepresented minority students.

Every few years, the THECB routinely reviews the universities it oversees to look for ways to cut costs and improve efficiencies.

"This is something that has been an ongoing effort at the coordinating board–to look at low producing programs," Stephenson said. "One of the challenges is how to allocate resources and make sure that students are getting the education that they need."

Daniel Marble, an assistant professor at Tarleton State University, does not think that shutting down the programs will save the state much money. Though the physics and hydrology degrees at his school are being discontinued, there are no planned layoffs associated with the shutdown.

"There's no savings whatsoever," Marble said. "Their job is to kill programs."

He said also that graduation numbers alone were not indicative of the health of the program. On the one hand he said that the physics program at his school has grown over the last few years and was set to graduate at least 5 students in 2012 and 2013. In addition Tarleton participated in a consortium with five other rural Texas schools where a professor would teach a class at his or her home institution, and that lesson would be telecast to the other schools. While all the schools shared in teaching the courses, students only graduated from one of the institutions, making graduation rates seem smaller than the number of students enrolled.

Heather Galloway, director of the University Honors program at Texas State University San Marcos and a member of the APS Executive Board, said that she was worried about the effect that closing the programs would have on the state. Texas passed a law requiring that all high school students to take physics classes, starting in 2005. Galloway said she was worried that there would be fewer universities to produce high school physics teachers.

"At a time when we should be building capacity to produce physics teachers, we are cutting programs," Galloway said. "There is a shortage of physics teachers and it's not going to get better."

Schools facing program shutdowns have one last appeal before them. In early October the university president can appear before the THECB and personally lobby to save programs. Most presidents have said they plan on fighting to keep the programs alive.

The Back Page

Fukushima: A Game Changer for Nuclear Energy?

Kate Marvel and Michael May

Anticipating the future is difficult in any situation, but assessing the prospects for nuclear power in the next fifty years presents especially complex challenges. The public perception of nuclear power has changed drastically since the introduction of the technology, and continues to change. Once viewed as a miracle of modern technology, nuclear power came to be perceived by many as a potential catastrophe. It is now viewed as a potential, albeit potentially dangerous, source of green power. Conventional wisdom in the 1960s held that nuclear power could dominate the electricity sectors of developed countries. Less than twenty years later, many predicted the complete demise of the U.S. nuclear industry following the Three Mile Island accident in 1979. Yet neither attitude fully forecast the situation today: a nuclear industry that has failed to achieve market dominance, is struggling with the aftermath of the Fukushima accident, but is far from dead. Indeed, the history of long-range planning for nuclear power serves as a caution for anyone wishing to make predictions about the state of the industry over the next half-century. Nonetheless, it is critical to assess its role in the future energy mix: decisions taken now will impact the energy sector for many years. This assessment requires both a review of past planning strategies and a new approach that considers alternate scenarios that may differ radically from business as usual.

While a number of studies have explored the future of nuclear power under various circumstances, a recent study by the authors[1] considers what could be potentially game changing events for nuclear energy. We take "the game" to be the current no-surprise scenario for the next fifty years: that is, a slow and uneven growth in nuclear power worldwide. Growth will be very strong in China and India, South Korea, and Russia, and sluggish in the United States and Western Europe, where current plans call for replacing, but not significantly expanding, the existing large fleets. The situation in Japan post-Fukushima is in a state of flux. This course of events will be the result of planned investments and government decisions, coupled with anticipated changes implemented over known horizons. Several variations of this scenario are accepted possibilities.

The ongoing situation at the Fukushima Daiichi Nuclear Power Station in Japan is a game changer for nuclear energy. While accidents are normal in any interaction of a complex facility and humans, they have tended to be game changers, for good and ill. The events at Fukushima were not included in planning horizons, yet they now could significantly affect the future of nuclear power. While the situation continues to evolve, a rough picture of the accident and its consequences has begun to emerge. A magnitude 9 earthquake, coupled with a 15 meter tsunami that overflowed the seawall, resulted in the failure of the electrical systems that pumped in cooling water to the reactors, leading to overheating in both the reactor cores and spent fuel storage pools, further damage to the cooling systems and the release of large amounts of radiation. The total amount of radiation release is gradually coming into focus, with 5-month cumulative levels outside the exclusion zone ranging up to 115 millisieverts, up to and over 500 millisieverts inside the zone, and total release into the sea, due to emergency cooling with seawater, now estimated at over 15000 trillion becquerels.[2]

Predictably, opinion polls show a reduction in popular support for nuclear power, particularly in the United States and most of the European Union. However, in the United States, the political response has been muted, with both the Republican leadership and the White House expressing continued support for nuclear power. At the extreme ends, the German government announced it will accelerate the phase-out of nuclear power while, at the time of this writing, China remains committed under its new Five-Year Plan to a target of more than 11 percent of primary energy from nonfossil sources. Meeting that target requires a large expansion of nuclear power.

• What will be the Medium-and Long-Term Effects?

Safety Reviews. In the immediate aftermath of the crisis, most countries that currently use nuclear power are likely to undertake major reviews of reactor safety. Shortly after the incident, the U.S. Nuclear Regulatory Commission announced an immediate ninety-day review focusing on emergency procedures, to be followed by a more extensive in-depth review of all U.S. reactors. Germany has closed seven of its seventeen reactors for safety checks. China has announced a comprehensive safety review at nuclear plants in operation and under construction. These reviews are emphasizing robustness against any form of loss of cooling, including loss triggered by earthquakes and tsunamis, as well as reconsidering the physical location and operation plan for backup power supplies.

The Fukushima Daiichi Nuclear Power Plant in 2002

• The General Electric Mark 1 Reactor Design. The Fukushima reactors were of the General Electric Mark 1 design and had been in service since the 1970s. While plants of this design have operated safely for a number of decades in a number of locations, the design does not reflect the safety improvements of more recent reactors, particularly with regard to backup cooling systems. In fact, the design has been criticized over the years on several counts, including possible rupture of the reactor containment vessel if all cooling failed and lack of containment for the highly radioactive spent fuel rods that had been removed from the reactor core and were cooling in the water pool. Some of those concerns are accentuated by the reactor's age and the attendant material degradation. In addition, Japan's nuclear safety agency has criticized TEPCO, the owner of the reactors, for failing to carry out required inspections of equipment, including essential elements of the cooling systems. It is not clear how much this failure affected the disaster.

Thirty-two reactors of the same type as those at Fukushima are in use in several countries, including twenty-three in the United States. A number have received or are currently being considered for license extensions beyond their original planned lifetime.[3]

Spent Fuel Storage. Some of the most severe consequences of the Fukushima accident resulted from a loss-of-coolant failure in the spent fuel pools. This possibility has focused attention on the storage and disposal of reactor spent fuel. There are three relevant timescales to consider: short-term storage, where spent fuel must be cooled following its removal from the reactor; medium-term storage, where spent fuel is stored in dry casks, usually on-site; and long-term disposal, which will likely require a geologic repository. Initial reviews are focusing on the immediate hazards of cooling spent fuel once it is removed from the reactor, with special attention paid not only to protecting and containing the spent fuel that is cooling in ponds but also to large amounts of older but still radioactive spent fuel stored in casks, as is the case in the United States, where no longer-term storage or disposal has been approved.

• Where are the Effects Likely to be Felt?

More than the Usual Suspects. The accident at Fukushima will have implications worldwide, but the effects are likely to differ from country to country and region to region. Development in the United States and the European Union has been slow, with the vast majority of added nuclear capacity taking the form of license extensions and renewals. The future of nuclear power will be determined largely by the countries with the most ambitious nuclear development plans: China, India, Russia, South Korea, and to a lesser extent, Brazil, Argentina, and perhaps South Africa. This realignment of the global nuclear future is significant, possibly diminishing the influence of the traditional nuclear powers. The policies of the United States and the European Union may have less influence on the development plans of the rest of the world.

The Fukushima disaster may impact the future of nuclear power more than either the Three Mile Island or Chernobyl accidents. The Three Mile Island accident was contained without public health effects, while the Chernobyl accident involved a Soviet reactor of a model that was not used in the West and that lacked a crucial containment feature. The Fukushima accident, on the other hand, occurred in one of the most technologically advanced countries in the world and one with among the most nuclear experience. Furthermore, it was caused by a tsunami–a worrying aspect, given that many reactors in the world, including practically all of China's reactors, are located by the sea. Moreover, it is the first nuclear disaster to occur in the Internet age, and information, rumors, and speculation have been reported to a wider audience than ever before.

• What is the Future for Nuclear Power?

How will the incident in Japan change the balance between the advantages and drawbacks of nuclear power? Given the developing situation, it is too early to make accurate forecasts of its ramifications; but indications are that the specific political and economic situations of individual countries will dominate their responses. We have noted the early actions of China and the United States. France, South Korea, and other countries that are highly dependent on nuclear-generated electricity have little option but to continue along the nuclear path, at least until new technologies are developed. Germany, however, is an important exception. Its decision to abandon nuclear power is consistent with the country's stated aim to phase out alternatives in favor of renewable sources, but it is unclear that wind, solar, and tidal power can compensate for shuttered nuclear plants in the near term. As a result, unless extremely ambitious goals for development, grid integration, and storage are met, Germany's nuclear future may be replaced by a coal-dependent one. Japan, while heavily dependent on nuclear power, is likely to be strongly affected, perhaps leading to changes in the leadership and regulation of the nuclear industry, as well as changes in such aspects as siting, reliance on seawalls, and location of backup cooling systems. In the longer term, advanced designs that have stronger safety features, and that are less dependent on the operation of backup systems in an emergency, will see their advantage over early designs increase.

It is not possible to anticipate or prevent all accidents, but it is noteworthy that most of the serious accidents that have affected the nuclear industry had earlier, less destructive precursors and were anticipated by engineers, operators, or managers, yet were not prevented. This fact is specifically true in the case of Fukushima: in an earlier incident at Le Blayais in France, the seawall was overrun and some low-lying pumps and generators were flooded, though without release of radiation.[4] Japan's nuclear safety agency had also warned against siting the backup generators on low ground. The cost of prevention in most cases would have been small, not only compared with the cost in dollars and political support of the most expensive accidents, but also compared with the overall cost of nuclear power. Thus, a major lesson from Fukushima and previous accidents or near-accidents concerns the management and supervision of the nuclear industry and the political and economic set of incentives involved. While this and other lessons tend to be reasonably well internalized within the countries where accidents have occurred, instilling them across national boundaries has been far less successful, a matter of some concern in view of the new entrants into the nuclear power field.

Over the next few months and years, as the details of the Fukushima accident become clearer, they will affect and inform the continuing conversation about the role nuclear energy will play in the future energy mix. Undoubtedly, the competitors to nuclear power, in both the present world and a possible future world where greenhouse gas emissions are taxed or regulated, have been at least temporarily strengthened by the event. For the longer term, while economic factors will continue to play a major role, the perceived likelihood of severe accidents will affect the political acceptability of nuclear power, particularly if it becomes clear that most such accidents can be prevented.

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